Jupiter Icy Moons Explorer
Second Stand Alone Missions of Opportunity Notice
Program Element Appendix K

Proposal Evaluation Plan

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Approval

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NASA Contributions to JUICE ESA Mission

The NASA contribution to the European Space Agency (ESA) Jupiter Icy Moons Explorer (JUICE) mission shall potentially consist of three types of contributions:

1) NASA-funded instrument investigations led by a U.S. Principal Investigator (PI),
2) NASA-funded instrument component(s) provided to non-U.S.-led instrument(s), or
3) NASA-funded U.S. Co-Investigators (Co-Is) on non-U.S.-led instrument(s).

NASA's entire contribution consisting of the sum of all three types of contributions shall not exceed $100M (RY) for total life cycle costs. Within this budget cap, NASA expects to fund approximately two U.S.-led instrument investigations along with a number of NASA-funded instrument components and U.S. Co-Is on non-U.S.-led instruments.

Introduction

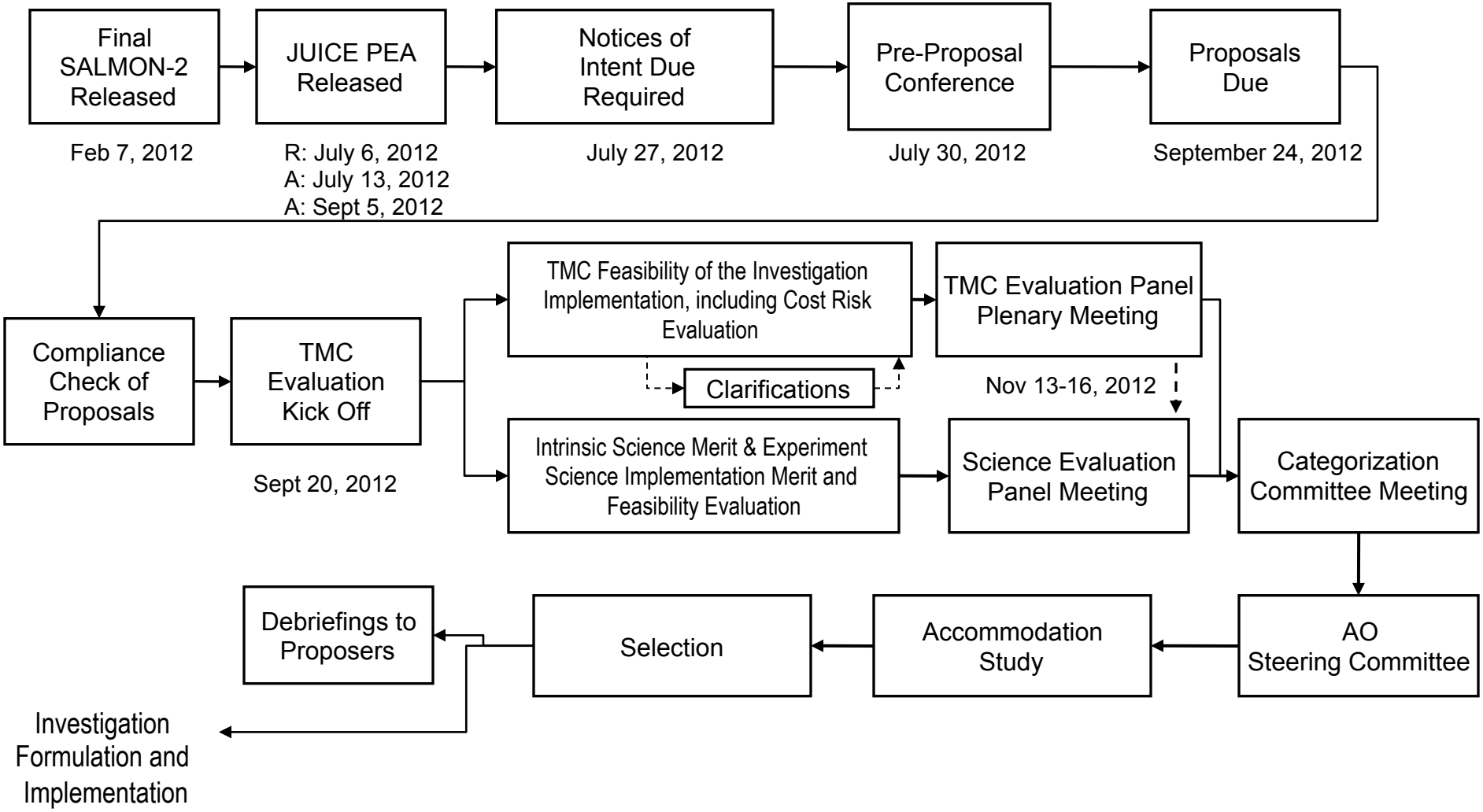
This is the Evaluation Plan for the JUICE - Program Element Appendix (PEA) K solicitation.

- This plan includes the evaluations of type one contributions which are the instrument investigations submitted in response to the JUICE PEA K of the Second Stand Alone Missions of Opportunity Notice (SALMON-2).
- This plan also addresses the NASA evaluation of US contributions of type two and three to non-US-led contributions to ESA proposals.
- This plan encompasses the *Intrinsic Science Merit & Experiment Science Implementation Merit and Feasibility Evaluation* (Factors A and B, Section 7.2 of the SALMON-2 AO; evaluated by the Science Panel) and the Technical, Management, and Cost (TMC) Feasibility of the Investigation Implementation, including Cost Risk Evaluation (Factor C, Section 7.2 of the SALMON-2 AO; evaluated by the TMC Panel) as applicable.

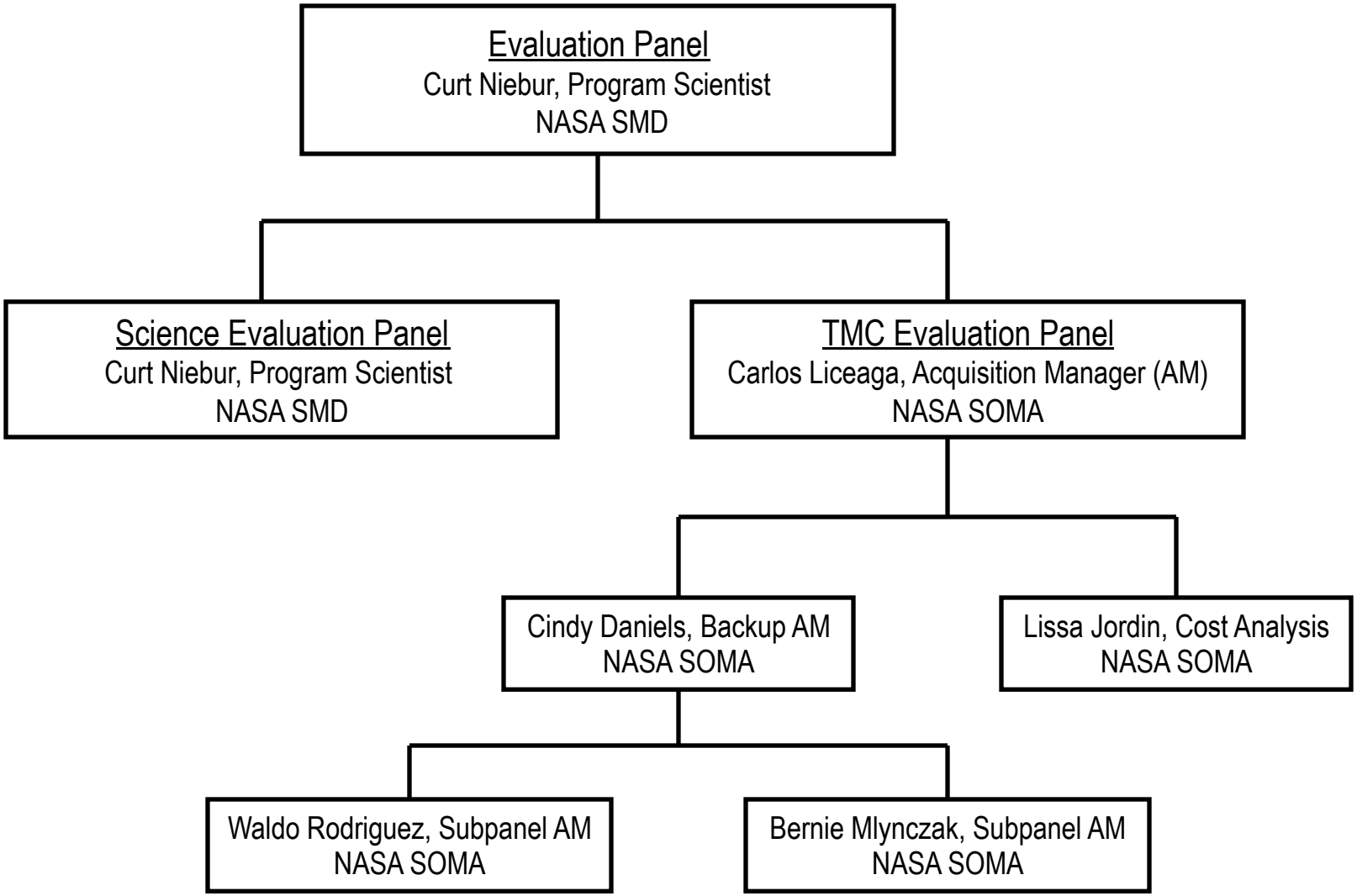
Principles for Evaluation

- All proposals are to be treated fairly and equally.
- Merit is to be assessed on the basis of material in the proposal.
- Ratings should reflect the written strengths and weaknesses.
- Everyone involved in the evaluation process is expected to act in an unbiased objective manner; advocacy for particular proposals is not appropriate.

Instrument PEA Proposal Evaluation Flow



NASA JUICE Evaluation Organization



Conflicts of Interest

- NRESS will cross-check all the science evaluation panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational Conflict Of Interest (COI) exists.

- Cornell Technical Services (CTS) will cross-check all TMC evaluation panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational COI exists.

- Additionally, all evaluators must divulge any other financial, professional, or potential personal conflicts of interest, and whether they work for a profit-making company that directly competes with any profit-making proposing organization.

- All Civil Service evaluators must file a Form OGE 450 or SF278 to be reviewed for financial conflicts of interest.

Conflicts of Interest

- All known conflict of interest issues are documented and a COI avoidance plan has been developed to minimize the likelihood that this will arise as an issue in the evaluation process. All determinations regarding possible COI that arise will be logged as an appendix to the COI avoidance plan.

- If any previously unknown potential conflict of interest arises during the evaluation, the conflicted member(s) will be notified to stop evaluating proposals immediately, and the Panel Chair will be notified immediately. Any actually conflicted member(s) will be immediately removed from the evaluation process, and steps will be taken, expeditiously, to remove, mitigate, or accept any actual or potential bias imposed by the conflicted member(s).

- Members of the Science and TMC Panels are prohibited from contacting anyone outside their panel for scientific/technical input, or consultation, without the prior approval of the Responsible Official.

Proprietary Data

- All proposal and evaluation materials are considered proprietary.
- Viewing of proposal materials will be only on a need-to-know basis.
- Each evaluator will sign a Non-Disclosure Agreement (NDA) that must be on file at NRESS prior to any proposals being distributed to that evaluator.
- All proposal materials will be numbered and controlled, and a record will be maintained as to which evaluator has what materials.
- Evaluators are not permitted to discuss proposals with anyone outside the Evaluation Team.
- All proprietary information that must be exchanged between evaluators will be exchanged *via* the secure NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), *via* the secure Remote Evaluation System (RES), *via* secured Webex, Adobe Connect, or *via* encrypted email, FedEx, fax, or regular mail. Weekly teleconferences among TMC evaluators will be conducted *via* secure telephone lines.
- Proposal materials will be collected from evaluators when the evaluation process is complete. Some copies will be archived in the NASA Research and Education Support Services (NRESS) and NASA Science Office for Mission Assessments (SOMA) vaults; all other proposal materials will be destroyed.

Evaluation: Ground Rules

- All Proposals will be evaluated to uniform standards established in the AO and the PEA, and without comparison to other Proposals.

- All evaluators will be peers of the proposers in the areas that they evaluate.

- Specialist Evaluators (to provide special technical expertise to the TMC Panel) and non-panel/mail-in Evaluators (to provide special science expertise to the Science Panel) may be utilized, respectively, based on need for expertise in a specific technology or science that is proposed.

Instrument PEA Clarification from Proposers

NASA will request clarification of potential major weaknesses identified during the TMC Feasibility of the Investigation Implementation, including Cost Risk evaluation. Similarly, NASA may request clarifications on potential major weaknesses identified during the Intrinsic Science Merit & Experiment Science Implementation Merit and Feasibility Evaluation.

- NASA will request such clarification uniformly, from all proposers.
- All requests for clarification from NASA, and the proposer's response, will be in writing.
- The ability of proposers to provide clarification to NASA is extremely limited, as NASA does not intend to enter into discussions with proposers.
- PIs whose proposals have no potential major weaknesses will receive an email informing them.
- The form of the clarifications is strictly limited to a few types of responses:
  - Identification of the locations in the proposal (page(s), section(s), line(s)) where the potential major weakness is addressed.
  - Noting that the potential major weakness is not addressed in the proposal.
  - Stating that the potential major weakness is invalidated by information that is common knowledge and is therefore not included in the proposal.
  - Stating that the analysis leading to the potential potential major weakness is incorrect and identifying a place in the proposal where data supporting a correct analysis may be found.
  - Stating that a typographical error appears in the proposal and that the correct data is available elsewhere inside or outside of the proposal.

The PI will be given at least 24 hours to respond to the request for clarification. Any response that goes beyond a clarification will be deleted and will not be shown to the evaluation panel.

SALMON-2 AO

Evaluation Criteria:

- Intrinsic Science Merit of the Proposed Investigation
- Experiment Science Implementation Merit and Feasibility of the Investigation
- TMC Feasibility of the Investigation Implementation, including Cost Risk

Weighting: the first criterion is weighted approximately 40%; the second and third criteria are weighted approximately 30% each.

JUICE Selection Factors

- Selection Factors from Section 6.2 of PEA K: The Selection Official may take into account a wide range of programmatic factors in deciding whether or not to select any proposals and in selecting among top-rated proposals, including, but not limited to,
  - planning and policy considerations,
  - available funding,
  - programmatic merit and risk of any proposed partnerships, and
  - maintaining a programmatic balance across the mission directorate(s).
  - For this JUICE PEA selection, these factors also include the likelihood that the proposed instrument can be accommodated on the JUICE spacecraft.

JUICE PEA Compliance Check

JUICE Compliance Criteria

Administrative:

1. Proposal submitted through NSPIRES on time
2. Meets page limits
3. Meets general requirements for digital file format (single searchable, bookmarked PDF, less than 25MB)
4. Meets general requirements for display format and completeness (maximum 55 lines text/page, maximum 15 characters/inch – approximately 12 pt font, 1 inch margins)
5. Required appendices included; no additional appendices
6. Budgets are submitted in required formats
7. All individual team members who are named on cover page indicate commitment through NSPIRES
8. All export-controlled information has been identified
9. Proposal must have submitted a NOI by the deadline in Section 7 of PEA K.

JUICE Compliance Criteria

Scientific:

10. Addresses solicited science programs
11. Requirements traceable from objectives to measurements to instruments to mission
12. Baseline investigation and threshold investigation defined

Technical:

13. Complete spaceflight mission (Phases A-F) proposed
14. Team led by a single PI
15. Includes commitment for E/PO program
16. PI-Managed Mission Cost within cost cap. No cost cap specified for JUICE.
17. Co-investigator costs in budget
18. Development schedule that delivers instrument prior to deadline
19. Includes table describing non-U.S. participation
20. Includes letters of commitment from funding agencies for non-U.S. participating institutions
21. Includes letters of commitment from all U.S. organizations offering contributions
22. Includes letters of commitment from all major partners

JUICE Science Evaluation for Type 1 Contributions submitted to NASA JUICE PEA

Typical Science Panel Composition & Organization

- The evaluation plan described here only applies to type 1 contributions submitted to the NASA JUICE PEA.
- The Program Scientist leads the Science Panel.
- Science evaluators are typically, but not exclusively, recruited from the academic, governmental, and industrial research communities.
- The Science Panel evaluates Intrinsic Science Merit & Experiment Science Implementation Merit and Feasibility.
- The science evaluation will be implemented *via* one Science Panel, however sub-panels may be employed, depending on the number and variety of proposed investigations.
  - All sub-panels will be led by a NASA Headquarters Civil Servant, with a co-chair from the scientific community.
  - All sub-panels will have an Executive Secretary.
- Each proposal will be evaluated by assigned panel members.
  - The Lead Evaluator for each proposal will lead the discussion.
  - A Supporting Evaluator will take notes on the discussion.
- The TMC Panel may provide comments and questions to the Science Panel.

Typical Science Panel Procedures

- Each member of the Science Panel will evaluate Proposals as directed by the Chair.
  - If special science expertise is required, the Science Panel may utilize non-panel/ mail-in evaluators to assist with one or more proposals.
  - Non-panel/mail-in evaluators will evaluate only those parts of proposals pertinent to their scientific specialties.
- Each proposal will be discussed by the evaluators a telecon.
  - Each evaluator will provide an individual evaluation prior to the telecon.
  - The telecon will discuss the proposal and the findings by the individual evaluators including non-panel evaluators.
  - Following the telecon, the Lead Evaluator captures/synthesizes individual evaluations including discussion and will generate the Draft Evaluation including draft findings.
  - The draft findings form the basis for the clarifications of draft major weaknesses.

Typical Science Panel Procedures

- A Science Evaluation Team Meeting will be held upon completion of Science Evaluation for all proposals.
  - The Science Panel will compile all of the findings for each proposal.
  - For each proposal, the Chair or designated Lead Evaluator will lead the discussion, summarize the proposed investigation, and document the results.
  - If warranted, the panel may reconsider evaluations at the Science Evaluation Team Meeting.
  - Evaluations of all proposals are reviewed during the Science Evaluation Team Meeting to ensure that standards have been applied uniformly and in an appropriate and fair manner.
  - The Lead Evaluator captures/synthesizes Panel evaluations.

Typical Science Panel Products

For each proposal, the Science Evaluation will result in:

- Form A
  - Proposal title, PI name, and submitting organization;
  - Based on findings, Scientific Merit of the Investigation adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
  - Summary rationale for the median rating;
  - Narrative findings, identified as major or minor strengths or weaknesses;
  - comments to PI; comments to NASA.
- Form B
  - Proposal title, PI name, and submitting organization;
  - Based on findings, a Scientific Implementation Merit and Feasibility of the Investigation adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
  - Summary rationale for the median rating;
  - Narrative findings, identified as major or minor strengths or weaknesses;
  - comments to PI; comments to NASA.

Science Panel Evaluation Factors (SALMON-2 AO Section 7.2)

Criterion A: Intrinsic Science Merit of the Proposed Investigation:

- Factor A-1. Compelling nature and priority of the proposed investigation's science goals and objectives.
- Factor A-2. Programmatic value of the proposed investigation
- Factor A-3. Likelihood of science success.
- Factor A-4. Science value of the Threshold Investigation.

Science Panel Evaluation Factor A-1

Compelling nature and priority of the proposed investigation's science goals and objectives. This factor includes the clarity of the goals and objectives; how well the goals and objectives reflect program, Agency, and National priorities; the potential impact of the investigation on program, Agency, and National science objectives; and the potential for fundamental progress, as well as filling gaps in our knowledge relative to the current state of the art.

Science Panel Evaluation Factor A-2

Programmatic value of the proposed investigation. This factor includes the unique value of the investigation to make science progress in the context of other ongoing and planned missions; the relationship to the other elements of NASA's programs; how well the investigation may synergistically support ongoing or planned missions by NASA and other agencies; and the necessity for a space mission to realize the goals and objectives.

Science Panel Evaluation Factor A-3

Likelihood of science success. This factor includes how well the anticipated measurements support the goals and objectives; the adequacy of the anticipated data to complete the investigation and meet the goals and objectives; and the appropriateness of the mission requirements for guiding development and ensuring success.

Science Panel Evaluation Factor A-4

Science value of the Threshold Investigation. This factor includes the intrinsic value of the Threshold Investigation using the standards in the first factor of this section and whether that value is sufficient to justify the proposed cost of the investigation.

Science Panel Evaluation Factors (SALMON-2 AO Section 7.2)

Criterion B: Experiment Science Implementation Merit and Feasibility of the Investigation:

- Factor B-1. Merit of the instruments and investigation design for addressing the science goals and objectives.
- Factor B-2. Probability of technical success
- Factor B-3. Merit of the data and/or sample analysis plan.
- Factor B-4. Science resiliency.
- Factor B-5. Probability of investigation team success.

Science Panel Evaluation Factor B-1

Merit of the instruments and investigation design for addressing the science goals and objectives. This factor includes the degree to which the proposed investigation will address the goals and objectives; the appropriateness of the selected instruments and investigation design for addressing the goals and objectives; the degree to which the proposed instruments and investigation can provide the necessary data; and the sufficiency of the data gathered to complete the science investigation.

Science Panel Evaluation Factor B-2

Probability of technical success. This factor includes the maturity and technical readiness of the instruments; the adequacy of the plan to develop the instruments within the proposed cost and schedule; the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks; the likelihood of success in developing any new technology that represents an untested advance in the state of the art; the ability of the development team – both institutions and individuals – to successfully implement those plans; and the likelihood of success for both the development and the operation of the instruments within the investigation design.

Science Panel Evaluation Factor B-3

Merit of the data and/or sample analysis plan. This factor includes the merit of plans for data and/or sample analysis, data archiving, ~~and/or sample curation~~ to meet the goals and objectives; to result in the publication of discoveries in the professional literature; and to preserve data ~~and samples~~ of value to the research and development community. Considerations in this factor include assessment of planning and budget adequacy and evidence of plans for well-documented, high-level data products and software useable to the entire research and development community; assessment of adequate resources for physical interpretation of data;

Science Panel Evaluation Factor B-3 cont'd

an assessment of the planning and budget adequacy and evidence of plans for the preliminary evaluation ~~and curation of any returned samples~~; reporting science results in the professional literature (*e.g.* refereed journals); and assessment of the proposed plan for the timely release of the data to the public domain for enlarging its impact.

Science Panel Evaluation Factor B-4

Science resiliency. This factor includes both developmental and operational resiliency. Developmental resiliency includes the approach to descoping the Baseline Investigation to the Threshold Investigation in the event that development problems force reductions in scope. Operational resiliency includes the ability to withstand adverse circumstances, the capability to degrade gracefully, and the potential to recover from anomalies in flight.

Science Panel Evaluation Factor B-5

Probability of investigation team success. This factor will be evaluated by assessing the experience, expertise, and organizational structure of the investigation team and the experiment design in light of any proposed instruments. The role of each Co-Investigator will be evaluated for necessary contributions to the proposed investigation; the inclusion of Co-Is who do not have a well defined and appropriate role may be cause for downgrading of the proposal.

Science Evaluation Products: Strengths and Weaknesses

- **Major Strength:** A facet of the response that is judged to be well above expectations and substantially contributes to the merit.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially detract from the merit.
- **Minor Strength:** A strength that substantiates the merit.
- **Minor Weakness:** A weakness that detracts from the merit.

Form A and B Grade Definitions

Form A and B Grade Definitions

- **Excellent**: A comprehensive, thorough, and compelling proposal of exceptional merit that fully responds to the objectives of the AO as documented by numerous and/or significant strengths and having no major weaknesses.
- **Very Good**: A fully competent proposal of very high merit that fully responds to the objectives of the AO, whose strengths fully outbalance any weaknesses.
- **Good:** A competent proposal that represents a credible response to the AO, having neither significant strengths nor weakness and/or whose strengths and weaknesses essentially balance.
- **Fair**: A proposal that provides a nominal response to the AO, but whose weaknesses outweigh any perceived strengths.
- **Poor**: A seriously flawed proposal having one or more major weaknesses (e.g., an inadequate or flawed plan of research or lack of focus on the objectives of the AO).

JUICE TMC Evaluation for Type 1 Contributions submitted to NASA JUICE PEA

Typical TMC Panel Composition & Organization

- The evaluation plan described here only applies to type 1 contributions submitted to the NASA JUICE PEA.
- The Acquisition Manager, who is a Civil Servant in the NASA Science Office of Mission Assessments (SOMA) at NASA Langley Research Center (LaRC), leads the TMC panel.
  - SOMA works directly for NASA Headquarters and is firewalled from the rest of LaRC.
- TMC evaluators are a mix of the best non-conflicted contractors, consultants, and Civil Servants who are experts in their respective fields.
  - Evaluators read every assigned proposal.
  - Evaluators provide ratings of proposals as well as findings.
- Additionally, specialist evaluators may be called upon in cases where technical expertise that is not represented on the panel is needed.
  - Specialist Evaluators evaluate only those parts of a proposal that are specific to their particular expertise.
  - Specialist Evaluators provide only findings; they do not provide ratings.

TMC Panel Evaluation Factors (SALMON-2 AO Section 7.2)

Criterion C: TMC Feasibility of the Investigation Implementation, including Cost Risk:

- Factor C-1. Adequacy and robustness of the instrument implementation plan.
- Factor C-2. Adequacy and robustness of the investigation design and plan for operations.
- ~~Factor C-3. Adequacy and robustness of the flight systems. *~~
- Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.
- Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.

**Factor C-3 not applicable to JUICE, other factors evaluated as applicable*

TMC Evaluation Factor C-1

Adequacy and robustness of the instrument implementation plan. The maturity and technical readiness of the instrument complement will be assessed, as will the ability of the instruments to meet investigation requirements. This factor includes an assessment of the instrument design, ~~accommodation, interface~~, heritage, and technology readiness. This factor includes an assessment of the instrument hardware and software designs, heritage, and contingency. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of the instrument complement. This factor also includes adequacy of the plans for instrument systems engineering and for dealing with environmental concerns. This factor includes an assessment of plans for the development and use of new instrument technology and the adequacy of backup plans to ensure success within the proposed cost and schedule when technologies having a TRL less than 6 are proposed.

TMC Evaluation Factor C-2

Adequacy and robustness of the investigation design and plan for operations. This factor includes an assessment of the overall investigation design and investigation architecture, and the concept for operations (including communication, navigation/tracking/trajectory analysis, and ground systems and facilities). This factor includes investigation resiliency – the flexibility to recover from problems during both development and operations – including the technical resource reserves, system and subsystem redundancy, and reductions and other changes that can be implemented without impact to the Baseline Investigation. This factor will be applied only to the extent that it is appropriate for the proposals solicited by the applicable PEA.

TMC Evaluation Factor C-4

Adequacy and robustness of the management approach and schedule, including the capability of the management team. This factor includes: the adequacy of the proposed organizational structure and WBS; the management approach including project level systems engineering; the roles, qualifications, and experience of the PI, PM, other named key management team members, and implementing organization, investigation management team, and known partners; the commitment, spaceflight experience, and relevant performance of the PI, PM, other named key management team members, and implementing organization, investigation management team, and known partners against the needs of the investigation; the commitments of partners and contributors; and the team's understanding of the scope of work covering all elements of the investigation, including contributions.

TMC Evaluation Factor C-4 (continued)

Also evaluated under this factor is the adequacy of the proposed risk management approach, including any risk mitigation plans for new technologies, any long-lead items, and the adequacy and availability of any required manufacturing, test, or other facilities. The approach to any proposed descoping of investigation capabilities will be assessed against the proposed Baseline Investigation. The plans for managing the risk of contributed critical goods and services will be assessed, including the plans for any international participation, the commitment of partners and contributors, as documented in Letters of Commitment, and the adequacy of contingency plans for coping with the failure of a proposed cooperative arrangement or contribution. This factor also includes assessment of proposal elements such as the relationship of the work to the project schedule, the project element interdependencies, the associated schedule margins, and an assessment of the likelihood of launching by the proposed launch date. Also evaluated under this factor are the proposed project and schedule management tools to be used on the project.

TMC Evaluation Factor C-5

Adequacy and robustness of the cost plan, including cost feasibility and cost risk. This factor includes proposal elements such as cost, cost risk, cost realism, and cost completeness including assessment of the basis of estimate, the adequacy of the approach, the methods and rationale used to develop the estimated cost, the discussion of cost risks, the allocation of cost reserves by phase, and the team's understanding of the scope of work (covering all elements of the investigation, including contributions). Proposals will be evaluated for the adequacy of the cost reserves and whether proposals with inadequate cost reserves demonstrate a thorough understanding of the cost risks. This factor also includes an assessment of the proposed cost relative to estimates generated using parametric models and analogies. Also evaluated under this factor are the proposed cost management tools to be used on the project.

Student Collaboration

Student Collaboration proposals, if any, will be evaluated only for the impact they have on TMC feasibility to the extent that they are not separable; student collaboration proposals will not be penalized for any inherent higher cost, schedule, or technical risk, as long as the student collaboration is shown to be clearly separable from the implementation of the Baseline Investigation. The intrinsic merit of student collaborations will not be evaluated at this time (see Section 5.7.2).

TMC Evaluation Subfactors

- Instruments
  - Instrument design
  - Design heritage
  - Environment concerns
  - Technology readiness
  - Hardware/Software design
  - Instrument systems engineering
  - Contingency

- Investigation Design and Operations
  - Science operations
  - Ground systems and facilities
  - Telecom
  - Investigation resiliency
- Management and Schedule
  - Roles, qualifications and experience of PI, PM and other key management members
  - Project management and systems engineering
  - Organizational structure and Work Breakdown Schedule (WBS)
  - International participation
  - Risk management, including mitigation plans
  - Project-level schedule, margins, and tools

- Cost
  - Basis of Estimate, Completeness, and Consistency
  - Cost risks and reserves
  - Application of Heritage
  - Comparison with TMC estimates (including parametric models and/or analogies)
  - Cost management tools

- Accommodation Comments

Accommodation Comments

- The review panel evaluating the third evaluation criterion; technical, management, and cost (TMC) feasibility of the proposed investigation, including cost risk, will also provide comments to NASA regarding the extent to which the proposed instrument is compatible with the JUICE spacecraft interfaces and operations.
- These comments will not contribute to the TMC feasibility risk rating but will be considered by the selection official.

Typical TMC Evaluation Product: Form C

For each proposal, the TMC evaluation will result in a Form C that contains:

- Proposal title, PI name, and submitting organization;
- An adjectival risk ratings from each evaluator of “LOW Risk”, “MEDIUM Risk” or “HIGH Risk” for the TMC Feasibility of the Mission Implementation, Including Cost Risk that is derived based on the findings;
- Summary rationale for the median risk rating;
- Narrative findings, identified as major or minor strengths or weaknesses, including cost analysis;
- Comments to the PI, comments to the Selection Official, comments to the Science Panel.

TMC Evaluation Product: Findings

Major and minor strengths and weaknesses are defined as follows:

- **Major Strength:** A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.

- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.

- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

*Note: Findings that are considered "as expected" are not documented in the Form C.

TMC Evaluation Product: Risk Ratings

Based on the narrative findings, each proposal will be assigned one of three risk ratings, defined as follows:

- **LOW Risk:** There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the Proposer's capability to accomplish the investigation well within the available resources.

- **MEDIUM Risk:** Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Mission design may be complex and resources tight.

- **HIGH Risk:** One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.

*Note: Only Major Findings are considered in the risk rating.

TMC Cost Analysis

- Initial cost analyses will be accomplished on the basis of information provided in the proposals (consistency, completeness, proposed basis of estimate, contributions, use full cost accounting, reserve levels, and cost management, etc.).
- Cost will be evaluated with one cost model and checked with an instrument complexity index.
- Cost threats, risks, and risk mitigations will be analyzed.
- Cost realism (a.k.a. “cost risk”) is based on models, analogies, heritage, and grass roots information from proposals.
  - Cost Realism is reported as an adjectival rating, ranging from “LOW Risk” to “HIGH Risk” on a five-point scale.
- Cost Evaluation Summaries and draft Forms C will be completed to the same level of detail prior to the Plenary meeting.
- During the TMC Plenary meeting, the entire panel will participate in Cost deliberations:
  - All information from the entire evaluation process will be considered in the final cost assessment.
- Significant findings from the Cost Evaluation Summaries will be documented in the Cost Factor on the Forms C and considered in the Form C grade.

Cost Risk Definitions

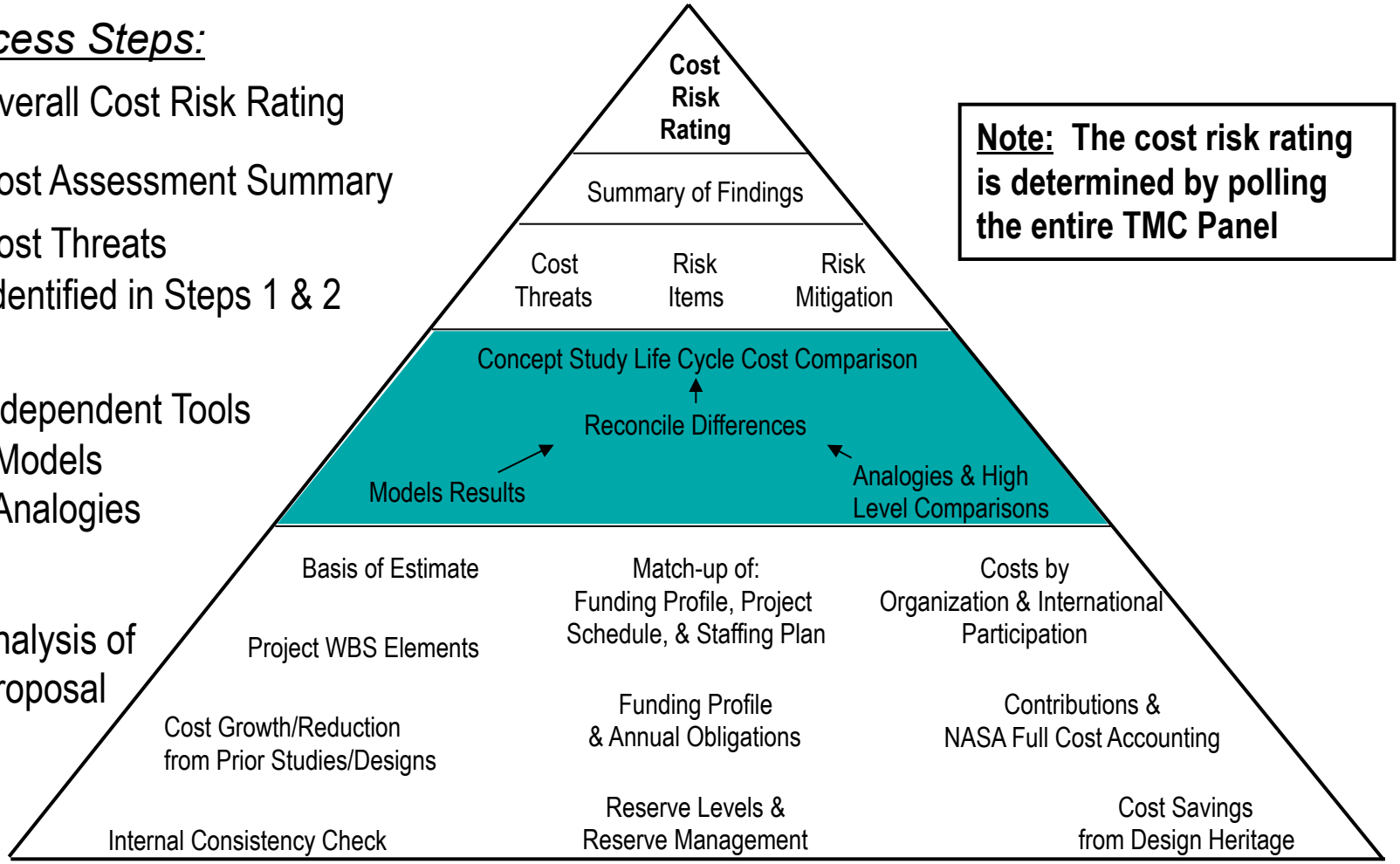
Cost Risk	Definition
LOW	***Cost Envelope is adequate – expect success.*** - The proposer's estimate *(with reserves)* agrees closely with the work, staffing, and schedule proposed, fits within the program cap and any other budget constraints, and is verified by TMC independent analysis. - The proposed cost reserve is adequate to address cost threats identified by TMC, and to fund unexpected needs. - The resource management plan indicates strong, active management of resources throughout implementation.
LOW/ MEDIUM	***Cost Envelope is somewhat tight, but project should succeed.*** - TMC identified one or more significant cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Overall impact of identified threats and weaknesses should be manageable. - TMC independent analysis verifies proposer's costs.
MEDIUM	***Cost Envelope is tight. Success requires diligent oversight of resources.*** - TMC identified one or more significant cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Cost impact of threats may be underestimated by proposer. Overall impact of identified threats and weaknesses should be manageable. - TMC independent analysis verifies some or most of proposer's costs.
MEDIUM /HIGH	***Cost Envelope is very tight. It is likely the project will require more funding.*** - TMC identified one or more major cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Cost impact of threats appears underestimated by proposer. Overall impact of identified threats and weaknesses will be challenging to manage within funding and/or schedule constraints. - TMC independent analysis could not verify significant elements of proposer's costs.
HIGH	***Project exceeds the Cost Envelope and is expected to require substantially more funding.*** - TMC identified one or more major cost threats or weaknesses in the proposer's estimate, cost reserves, and/or resource management. Overall impact of identified threats and weaknesses exceeds proposed resources and/or available resources to cover them. Threats are not acknowledged, or are underestimated by proposer. - TMC independent analysis could not verify proposer's costs.

TMC Evaluation Process

TMC Cost Analysis: The Pyramid

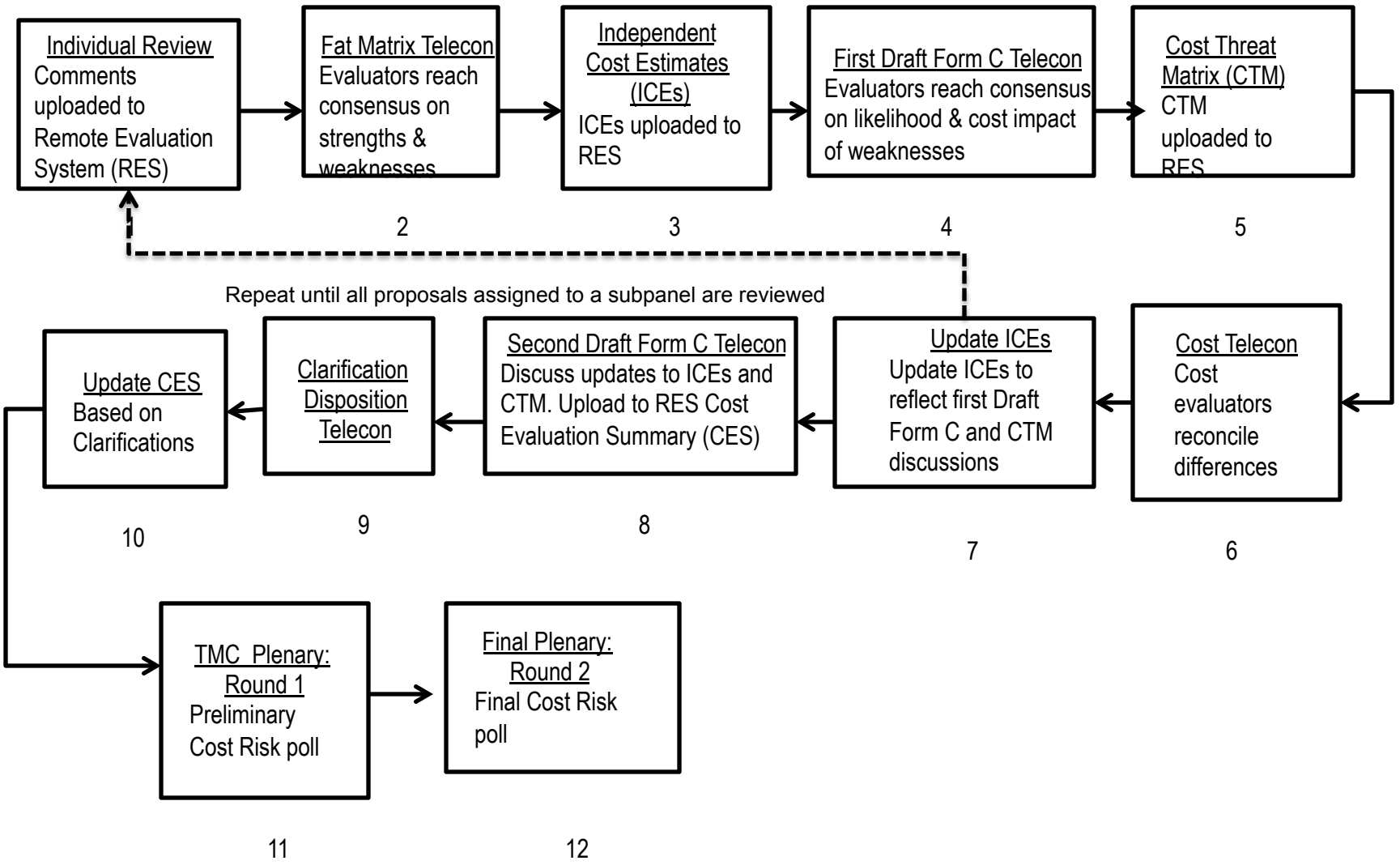
Process Steps:

5. Overall Cost Risk Rating
4. Cost Assessment Summary
3. Cost Threats identified in Steps 1 & 2
2. Independent Tools
   - Models
   - Analogies
1. Analysis of Proposal



Note: **The cost risk rating is determined by polling the entire TMC Panel**

CSR Cost Evaluation Process



TMC Cost Evaluation Process

- A guiding principle for the TMC evaluation process is that individual reviews will occur first and individual evaluation comments will be entered into the Remote Evaluation System (RES) prior to multi evaluator discussions to the extent that this is feasible. This principle is being implemented as described below for cost related comments and products on the JUICE Instrument Evaluation.

1. Each Cost Analyst enters cost findings in the RES. Each cost evaluators read the assigned proposal and uses a model to generate a preliminary Independent Cost Estimate (ICE) and a set of cost findings.
2. Criterion C Panel review of individual comments. The cost evaluators and all other Criterion C evaluators participate in a Fat Matrix Telecon (FMT). In this telecon all individual comments entered in the RES are discussed for all evaluation Criterion C Factors. The preliminary ICEs are not discussed during the FMT.
3. Generate Version 1 of ICE based on Criterion C Panel discussion. After the FMT, each cost evaluators will generate an ICE based only on the assumptions and discussion from the FMT. The ICE WBS elements as reported in the Cost Evaluation Summary will be rounded to the nearest $1M. These estimates will be presented at the first Draft Form C telecons to all Criterion evaluators. No changes to the ICEs (generated based on the FMT) will be made until after listening to discussions with all evaluators at the first Draft Form C telecon.
4. ICEs presented at first Draft Form C Telecon. A Draft Form C telecon includes participation of all Criterion C evaluators where all major and minor strengths or weaknesses are discussed. The Version 1 ICEs for each proposal will be presented. The likelihood and cost impact, if any, of each weakness is discussed. The Instrument Level of Difficulty (LDI) will be discussed.
5. Cost threat matrix. Subsequent to the first Draft Form C telecon, a cost threat matrix is developed for each proposal that reflects the discussion of the Criterion C Panel on the likelihood and impact of significant weaknesses. This is posted to the RES for all Criterion C evaluators to access.

TMC Cost Evaluation Process

6. Cost Telecon. A cost telecon among all three cost evaluators will occur after the first Draft Form C telecon to reconcile differences in detailed assumptions that may affect the ICEs.
7. Update ICEs based on first Draft Form C telecon. The cost analysts will update their ICEs to reflect the first Draft Form C discussions and the cost threat matrix discussions. If possible, cost threats with a likelihood > 80% will be included in the ICE. The likely total cost impact of cost threats not included in the ICE will be calculated by multiplying their mean likelihood by their mean impact and totaling those products.
8. Review of ICE, cost threat matrix, and LDI at second Draft Form C Telecon. Discuss updates to ICE, the cost threat matrix, and LDI. Upload to RES Cost Evaluation Summary – which includes the cost threat matrix, the ICE, and LDI for each proposal– for all Criterion C evaluators to access.

   Cost Findings Sent to Proposer. Statements which represent the cost threat matrix will be included in the weaknesses sent to proposers for clarification in order to provide the proposer an opportunity to clarify any misunderstanding. Statements describing significant cost findings based on the ICE will be sent to the proposer in order to provide the proposer an opportunity to clarify any misunderstanding.

   – ICE related cost findings will be treated in a consistent manner across all proposals.
   – If the proposers estimate for any WBS element is below the error range of the average ICE, the proposer will be sent a clarification comment stating that the proposers estimate for that WBS element could not be validated.
   – Cost related findings which may substantiate a weakness will be sent to the proposer for clarification.

TMC Cost Evaluation Process

9. Clarification Disposition. A Clarification Disposition Telecon is held with all evaluators is held. Dispositions may affect the ICE, LDI, or CTM.
10. Update CES based on Clarification. Based on the review by the entire Criterion C Panel of the disposition of clarifications, the CTM, ICE, LDI or cost findings may need to be updated. Cost threats with a likelihood > 80% will be updated if they have been included in the ICE. The likely total cost impact of cost threats not included in the ICE will be updated.
11. Final Plenary: Round 1. In Round 1, all major strengths or weaknesses are discussed. Minor are reviewed only as an exception. Each proposal's cost threat matrix, ICE, and LDI are reviewed. A preliminary Cost Risk Poll for each proposal is held during Round 1. Each proposal's cost threat matrix and ICEs will be updated to reflect the Round 1 discussions.
12. Final Plenary: Round 2. In Round 2, all major strengths or weaknesses are discussed. Each proposal's cost threat matrix and the ICE are reviewed, with a focus on any Round 1 based updates. A Final Cost Risk Poll for each proposal is held during Round 2. Each proposal's cost threat and the ICEs will be updated to reflect the Round 2 discussions.

Cost Threat Matrix

- The *likelihood* and *cost impact*, if any, of each weakness is stated as "This finding represents a cost threat assessed to have a Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Minimal/Limited/Moderate/Significant/Very Significant cost impact being realized during development and/or operations."
- The *likelihood* is the probability range that the *cost impact* will materialize.
- The *cost impact* is the current best estimate of the range of costs to mitigate the realized threat.
- The cost threat matrix below defines the adjectives used to describe the *likelihood* and *cost impact*.

		Cost Impact (CI, % of PI-Managed Investigation cost to complete Phases A/B/C/D)					**How cost threat was included in the ICE**
		Minimal (2.5% < CI ≤ 5%)	Limited (5% < CI ≤ 10%)	Moderate (10% < CI ≤ 15%)	Significant (15% < CI ≤ 20%)	Very Significant (CI > 20%)	
Likelihood (L, %)	Almost Certain (L > 80%)						
	Very Likely (60% < L ≤ 80%)						
	Likely (40% < L ≤ 60%)						
	Possible (20% < L ≤ 40%)						
	Unlikely (L ≤ 20%)						

Categorization

Categorization of Type 1 Contributions

Upon completion of the evaluations, the results will be presented to the Categorization Committee, an *ad hoc* subcommittee of the SMD AO Steering Committee composed solely of Civil Servants and IPA (Intergovernmental Personnel Act) appointees. The Steering Committee is appointed by the Deputy Associate Administrator for Research.

The Categorization Committee will consider the evaluation results and, based on the evaluations, will categorize each proposal according to procedures required by NFS 1872.403-1(e). The categories are defined as:

- Category I. Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and data that can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Categorization (continued)

- Category II. Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

- Category III. Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.

- Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

- Once Categorization has been completed, the Evaluation is considered ended unless found deficient by a subsequent review.

Accommodation Comments

- After categorization but prior to the selection decision, NASA may consider various combinations of selections. This may require support from a few TMC members.

NASA Evaluation of U.S. Contributions to non-U.S.-led Proposals

NASA Evaluation of U.S. Contributions to non-NASA-led ESA proposals

- NASA expects that proposals led by non-U.S. PIs will be submitted in response to the ESA AO.
- Information about proposals submitted to ESA with a U.S. contribution requesting NASA funding (either for personnel, instrument components, or any combination thereof) will be provided to NASA by ESA at any level to the extent required by NASA for their evaluation of such proposals
- NASA will review only the NASA contribution of those proposals. ESA will share relevant information with NASA regarding its review of those full proposals from its evaluation panel(s), and NASA will consider the ESA evaluation results as part of its selection process.

Overview of NASA Evaluation of U.S. Contributions to non-NASA-led ESA proposals

- NASA will appropriately scale the review of type 2 and 3 NASA contributions to non-U.S.-led proposals submitted to ESA's AO
  - The limited information available for these contributions will vary by proposal and limit the extent and depth of the NASA evaluation
- The science review will be conducted by the JUICE Program Scientist and generate findings but no grade
  - This review is expected to only involve PSD personnel
- Technical review will be conducted by TMC panel and generate findings but no grade
  - This review is expected to involve a subset of the TMC panel
- Type 2 and 3 contributions will not undergo Categorization or Steering
- The JUICE Program Scientist will develop selection recommendations based in part on the results of the science and technical reviews

Review of NASA-funded instrument component(s) Contributed to ESA proposals

A TMC review of NASA-funded instrument component(s) provided to non-U.S.-led instrument(s) will be performed.

- The review will only relate to the *TMC Feasibility of the Investigation Implementation, including Cost Risk* criterion.
- The result of the review will be comments developed by assigned TMC reviewers.
- The number of TMC reviewers assigned will be related to the complexity of the hardware contribution and the scope of the content provided for review.
- It is expected that most contributions will be too small to run a cost model. In this case cost comments may be provided.
- A cost model may be run for contributions of significant complexity.
- The final product is only TMC related comments of approximately one page that resulted from the review.
- No TMC grade is assigned.
- The NASA JUICE Program Scientist will develop selection recommendations based on the results of this review.

NASA Review of NASA-funded U.S. Co-Investigators (Co-Is) Contributed to ESA proposals

- NASA review of NASA-funded U.S. Co-Investigators (Co-Is) on non-U.S.-led instrument(s).
  - NASA will review the proposed role and level of support requested for each Co-I.
  - The NASA JUICE Program Scientist will develop selection recommendations based on the results this review.

Observers and Transition Briefing

- The Deputy Associate Administrator for Research may invite Civil Servants and Contractors with downstream implementation responsibilities to participate as observers to panel meetings and site visits.
  - Observers must comply with SMD Policy Document SPD-17, *Statement of Policy on Observers at Panel Reviews of Proposals*. This policy will be provided to all approved TMC Evaluation Team to Civil Servants in the Program Office and at Headquarters who have implementation responsibilities.
  - After selection is announced, a Transition Briefing will be provided by the Evaluation Team to Civil Servants in the Program Office and at Headquarters who have implementation responsibilities.

TMC Plenary Meeting Observers

The Persons below have been approved to attend the JUICE Plenary Meeting as Observers. The approval was obtained following the process outlined in the document “Statement of Policy on Observers at Panel Reviews of Proposals,” October 9, 2009. The observers shall abide by the rules of behavior outlined in that document. The approved observers are:

1. SOMA CS personnel not in the organizational chart on slide 7

2. ESA Personnel
   Christian Erd
   Luigi Colangeli;